Response to the NSW Data Centre Consultation Paper

Net Zero Institute (NZI)

The University of Sydney

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Overview

The Net Zero Institute (NZI) at the University of Sydney welcomes the opportunity to respond to the NSW Government's Data Centre Consultation Paper (March 2026). This submission draws on NZI's research expertise in AI, digital infrastructure, energy systems, cooling technologies, water management, and climate policy.

This submission is prepared with a primary focus on AI, digital infrastructure, and energy systems. It also draws on NZI's earlier joint submission with the Centre for AI, Trust and Governance (CAITG) to the NSW Legislative Council Public Accountability and Works Committee inquiry into data centres (March 2026)[1] for perspectives on water management, planning, and circular economy matters.

NZI supports the principles-based approach set out in the Consultation Paper. Data centres are no longer purely commercial infrastructure. They are becoming foundational coordination infrastructure around which advanced digital economies organise themselves. As AI adoption accelerates, compute capability, energy coordination, and digital ecosystem maturity are becoming intertwined determinants of long-term economic competitiveness. NSW's approach to data centre investment must reflect this reality.

[1] Net Zero Institute & Centre for AI, Trust and Governance, University of Sydney, *Submission to the NSW Parliamentary Inquiry on Data Centres*, March 2026 (hereafter 'NZI–CAITG 2026').

Principle 1: Investment in data centres should enable a wider technology ecosystem that drives job creation and propels economic growth

What opportunities does data centre investment present to you and your sector? How can data centre development best support local businesses and economic activity? What are the economic opportunities for NSW?

NZI supports the ambition to leverage data centre investment as a catalyst for a broader technology ecosystem in NSW. The economic case extends well beyond direct construction and operational employment. The largest economic impacts frequently emerge indirectly through intermediary digital service ecosystems surrounding cloud and AI infrastructure, including software engineering, AI operations, cloud integration, managed services, cybersecurity, and data analytics. Regions that effectively coordinate infrastructure capability, workforce sophistication, and research ecosystems are more likely to attract disproportionate shares of future high-value digital investment.

Sovereign digital infrastructure

NSW should treat data centres as part of sovereign digital infrastructure, not simply private commercial developments. Data centres underpin AI systems, health services, research computing, defence-adjacent capabilities, financial systems, education, and public services. This framing justifies greater government engagement in siting, performance standards, and long-term capability development, and it aligns NSW's approach with the national data centre expectations published by the Australian Government in March 2026.

AI and green computing as a local industry opportunity

Data centres supporting AI workloads represent a step change in electricity demand intensity, distinct from traditional commercial loads.[2] This distinction creates a specific local opportunity. NZI's research in green computing and AI-enabled grid optimisation shows that intelligent workload scheduling and demand response mechanisms can materially reduce peak grid stress while maintaining commercial performance. These capabilities can be developed and commercialised locally, generating knowledge-intensive employment in NSW.

NSW should position itself not only as a destination for data centre investment, but as a location where the software and systems that make data centres more efficient are also developed. This requires deliberate policy support for local AI and green computing research and commercialisation.

Workforce pipeline

Investment in physical infrastructure must be accompanied by investment in human capability. NSW should develop a coordinated workforce pipeline through partnerships between universities, TAFE, industry, and government to build specialist skills in data centre opera-

[2] NZI–CAITG 2026, Priority Area 1: Electricity Demand, Grid Impacts and Emissions.

tions, AI systems, energy-aware computing, cybersecurity, and cooling technologies. NZI is well-positioned to contribute to curriculum development and research training in these areas.

University research as a co-location opportunity

The Consultation Paper focuses on commercial sectors as co-location beneficiaries. NZI notes that university research is an equally important use case. Research at NZI and across the University of Sydney spans climate modelling, genomics, advanced manufacturing simulation, and AI-assisted drug discovery. Each of these relies on large-scale compute access and would benefit materially from proximity to data centre infrastructure. Government should consider mechanisms to facilitate research sector access to data centre compute capacity, including preferential connection arrangements or collaborative infrastructure agreements.

SME participation beyond construction

Local business participation should not be limited to construction supply chains. NSW should develop mechanisms that allow local SMEs to participate in software development, monitoring systems, energy optimisation, digital twins, maintenance services, cybersecurity, and lifecycle management. These segments offer sustainable, higher-skill employment and are more likely to generate lasting local economic capability than construction-phase supply alone.

Local content requirements

NZI supports the development of local content measures, provided these are designed collaboratively with industry and academia to target areas of genuine local competitive advantage, evaluated against measurable outcomes including quality of employment and supply chain depth, and subject to independent research assessment to avoid unintended trade-offs.

> **Recommendation 1.** The NSW Government should commission independent research, in partnership with universities including NZI, to map local content opportunities across the data centre supply chain and establish evidence-based benchmarks for the Data Centre Guidelines. This work should include a coordinated workforce pipeline strategy developed with universities, TAFE, and industry.

Principle 2: Data centre developers and operators need to fund their infrastructure requirements so as to not increase prices for households

How can industry support additional renewable energy generation and firming? Are there market-based solutions that can match additive utility capacity with energy and water demand? How can industry support government efforts to develop additional water and energy infrastructure, while ensuring costs are shared fairly?

NZI strongly endorses Principle 2. The principle that data centre proponents should bear the infrastructure costs their connections require is both economically sound and consistent

with equitable cost allocation policy. These costs should not be passed on to households.

Renewable energy: additionality and time-matched clean energy

NZI's research on renewables integration and energy storage supports the use of Power Purchase Agreements (PPAs) as a mechanism to drive additional renewable generation capacity. However, PPAs alone are insufficient.[3] Two requirements are essential.

First, PPAs must require genuine additionality, meaning they must support new renewable capacity rather than allocating existing generation. Without this, data centres may claim renewable supply that already exists while increasing total system demand, producing no net emissions benefit.

Second, the framework should move beyond annual renewable matching toward time-matched clean energy procurement. Data centres should demonstrate that their clean energy supply aligns with their consumption on an hourly or sub-hourly basis. NZI recommends that:

- PPAs be structured to require additionality and time-matched clean energy supply;
- large-scale Battery Energy Storage Systems (BESS) be incorporated as a condition of connection for data centres above a defined capacity threshold;
- demand response obligations be embedded in development consent conditions; and
- AI-enabled workload scheduling be recognised and encouraged as a demand response tool, allowing operators to shift non-time-sensitive compute loads away from peak grid demand periods.

Network augmentation transparency

There should be transparent public disclosure of who pays for grid upgrades associated with data centre connections, including transmission and distribution augmentation, substations, backup generation, and water infrastructure. NZI supports regulatory reform to ensure transmission costs are recovered from proponents rather than the broader consumer base, including upstream infrastructure such as the Sydney Ring South.

Backup diesel generation

Data centres rely heavily on diesel generators for backup power. This has material implications for local air quality, greenhouse gas emissions, and community health, particularly where multiple data centres cluster together. NZI recommends that the Data Centre Guidelines require time-bound transition pathways away from diesel backup toward BESS or other low-emission alternatives, and that data centres near community-sensitive sites be subject to enhanced air quality monitoring.

Water infrastructure

NZI's earlier submission noted the importance of transparent and equitable water infrastructure cost allocation, and the risk that data centres displace spare capacity built to service

[3] NZI–CAITG 2026, Priority Area 1: Electricity Demand, Grid Impacts and Emissions.

future household demand.[4] NZI supports the Consultation Paper's direction on this issue and defers to relevant NZI water management researchers for detailed recommendations.

> **Recommendation 2.** The NSW Government should establish a clear regulatory pathway, with defined milestones, requiring data centres to fund the full upstream cost of energy and water infrastructure their connections require. PPAs should demonstrate additionality and time-matched clean energy supply. Transparent public disclosure of network augmentation cost allocation should be mandated.

Principle 3: Data centres need to be efficient and make sustainable use of our energy and water systems as well as the environment

What performance measures and actions will be effective in driving sustainable data centre investment? What are the impacts that need to be considered for broader community resources? How can industry support water and energy system sustainability and mitigate environmental impacts?

NZI's primary contribution to this principle is on energy performance and AI-enabled efficiency. On water, circular economy, and climate resilience matters, we draw on NZI's institutional position from our earlier submission and the expertise of relevant NZI researchers.

Beyond PUE: a comprehensive efficiency framework

The Consultation Paper focuses on Power Usage Effectiveness (PUE) and Water Usage Effectiveness (WUE). NZI recommends a more comprehensive framework that also includes:

- **Carbon Usage Effectiveness (CUE):** measuring the carbon intensity of energy consumed, not merely the quantity. CUE incentivises procurement of genuinely low-carbon energy and is increasingly adopted in leading jurisdictions;
- **Embodied carbon:** construction of data centres involves significant quantities of concrete, steel, cooling equipment, batteries, generators, and electronics. Operational energy is only part of the sustainability picture; and
- **Lifecycle emissions:** a full lifecycle perspective, from construction through operation to decommissioning, provides a more accurate picture of environmental impact.

Benchmarks for all metrics should be grounded in an independent evidence base adapted to NSW conditions, and subject to mandatory post-occupancy reporting against actual operational performance.

AI-enabled energy optimisation

The Consultation Paper does not address the role of AI in managing data centre energy consumption. NZI's research identifies this as a significant gap. AI-enabled systems can

[4] NZI–CAITG 2026, Priority Area 2: Water Use, Cooling and Climate Resilience.

optimise cooling, power distribution, and workload scheduling in real time, reducing both energy intensity and grid impact. Government should consider requiring large data centres to demonstrate AI-enabled energy management capabilities as a condition of consent, and to report on actual energy savings achieved.

Carbon-aware scheduling is a related opportunity. Data centres can shift workloads to times when the grid is running on higher proportions of renewable energy. This approach moves beyond annual renewable matching toward more transparent, location-based emissions accounting.[5] NSW should consider how to incentivise or require this for large facilities.

Waste heat recovery

Data centres generate significant quantities of waste heat that is currently dissipated without productive use. NSW should encourage or require assessment of whether waste heat can support nearby industrial, commercial, residential, or research uses. This is particularly relevant for data centres co-located near university campuses, hospitals, or industrial precincts, and would contribute to circular resource loops within urban and regional areas.

Backup diesel generators and air quality

The Data Centre Guidelines should require time-bound transition pathways away from diesel backup generation toward BESS or alternative low-emission solutions. Data centres near community-sensitive sites such as schools, hospitals, and residential areas should be subject to stricter generator operation constraints and enhanced air quality monitoring.

Climate resilience

NSW's planning framework should explicitly address climate resilience. Extreme heat, drought, bushfire risk, flooding, and water scarcity are all directly relevant to data centre siting, design, and operation in NSW. Cooling systems that perform well under average conditions may fail under extreme heat. Water-dependent cooling is vulnerable to drought and water restrictions. Planning assessments should require explicit treatment of climate risk across the full operational life of facilities.

Water efficiency and circular economy

NZI's earlier submission identified priority areas including advanced cooling technologies that reduce water intensity, trade-offs between water efficiency and energy demand that are often poorly captured in planning assessments, and the need for stronger e-waste governance frameworks.[6] NZI supports the Consultation Paper's direction on recycled water use, WUE benchmarks, and sustainability rating schemes, and recommends that these be developed with relevant NZI researchers and industry.

> **Recommendation 3.** The NSW Government should develop a comprehensive efficiency framework for data centres covering PUE, WUE, CUE, and embodied carbon.

[5] NZI–CAITG 2026, Priority Area 1: Carbon-aware scheduling and emissions accounting approaches.
[6] NZI–CAITG 2026, Priority Areas 2 and 4.

Benchmarks should be developed collaboratively with university researchers and industry, grounded in an independent NSW-specific evidence base, and subject to mandatory post-occupancy reporting. Planning assessments should explicitly require waste heat recovery assessment and climate resilience analysis.

Principle 4: Data centre approval and compliance must be based on reliable and transparent data

What performance measures and actions will be effective in driving sustainable data centre investment? What information does industry need to provide clarity in proposals?

NZI regards Principle 4 as foundational to the credibility of the entire regulatory framework. The current reliance on proponent-supplied data with limited independent verification is insufficient for infrastructure decisions of this scale and permanence.

An independent monitoring and standards framework

NZI recommends that the NSW Government establish a formal Government–University–Industry research collaboration to:

- develop agreed methodologies and common assumptions for energy and water demand forecasting;
- provide independent validation of proponent-supplied demand forecasts prior to development consent;
- monitor actual operational performance against consented benchmarks on an ongoing basis; and
- publish aggregated, de-identified sector performance data to enable evidence-based policy refinement over time.

Universities, including the University of Sydney through NZI, are well-positioned to serve as trusted neutral parties, providing research capacity and analytical independence without commercial conflicts of interest.[7]

Common metrics and public reporting

The framework should specify a standardised reporting set covering: energy use and peak demand; PUE, WUE, and CUE; backup generation use and fuel type; renewable energy matching method and percentage; water source and consumption; carbon intensity; grid flexibility participation; and consent compliance status.

NSW should establish a public data centre performance dashboard or annual performance report. This would improve community trust, support evidence-based policymaking, and allow NSW to benchmark itself against leading jurisdictions.

[7] NZI–CAITG 2026, Priority Area 4: Governance, Transparency and Accountability.

Forecast-versus-actual reporting

Developers should be required to report actual energy and water demand against their original forecasts over time. This creates a direct feedback loop between planning assumptions and real-world outcomes, improving future forecast quality and creating accountability for optimistic projections. Given that AI workloads and cloud architectures evolve rapidly, this feedback mechanism is particularly important.

Smart metering and data sharing

Equivalent smart metering requirements should apply to energy consumption at the subsystem level, covering cooling, IT load, and backup generation. Data sharing protocols should be developed in consultation with industry to ensure commercially sensitive information is protected, consistent with the Security of Critical Infrastructure Act 2018.

> **Recommendation 4.** The NSW Government should establish a formal Government–University–Industry data monitoring and standards framework for NSW data centres, with NZI and other relevant university research groups engaged as independent research partners. The framework should include a standardised reporting set, a public performance dashboard, and mandatory forecast-versus-actual reporting by all data centre proponents.

Principle 5: Regulatory and planning settings must take account of differences in the size and location of data centres, and community needs

What further collaboration opportunities could be investigated? How can planning and regulatory settings support industry to adopt and invest in best practices tailored to project conditions?

NZI supports the move toward a flexible, performance-based planning framework. Uniform prescriptive requirements are poorly suited to the diversity of data centre types, scales, and locations across NSW. However, flexibility must be accompanied by genuine accountability mechanisms.[8]

Infrastructure sequencing and regional flexibility

Planning approvals should be better aligned with realistic timelines for grid, water, and workforce capacity.[9] Flexibility should be tied to demonstrated infrastructure readiness across energy supply, water access, connectivity, workforce availability, and emergency service capacity. Geographic location alone should not determine eligibility. Regional data centres should not be approved simply because land is available.

[8] NZI–CAITG 2026, Key Areas of Focus: Transparency and public trust.
[9] NZI–CAITG 2026, Key Areas of Focus: Infrastructure sequencing and readiness.

Cumulative and systems-level impacts

Data centres must be assessed not only as individual projects, but as clustered, long-lived infrastructure with compounding impacts on energy, water, land, and communities.[10] NZI recommends that:

- the Data Centre Guidelines require cumulative impact assessment for new proposals in areas with existing or approved data centre clusters;
- high-concentration zones such as Western Sydney growth corridors be subject to precinct-level planning, not only individual project assessment; and
- planning authorities develop area-level capacity budgets for energy and water demand in these zones.

Land-use conflict

Data centres can compete with housing, industrial land, agriculture, biodiversity corridors, and transport infrastructure. This competition is particularly acute in Western Sydney and other growth corridors. The Statewide Industrial Lands Policy consultation should explicitly address data centre clustering and its interaction with housing delivery and other strategic land uses.

Community benefit and social licence

Communities hosting data centres should receive tangible benefits in return. The framework should specify what proponents are expected to contribute, including local employment and training commitments, waste heat reuse where feasible, community energy benefits, local infrastructure contributions, and genuine community consultation. Social licence must be earned through transparency and meaningful community benefit, not assumed.

Emergency and disaster resilience

Planning should consider the full range of hazards relevant to NSW, including bushfires, floods, heatwaves, local grid outages, cyber incidents, and physical security risks. Data centres are critical infrastructure whose failure under disaster conditions would have cascading effects. Resilience planning should be an explicit requirement of development consent.

Performance-based pathways and accountability

Performance-based pathways must specify clear, measurable outcomes rather than vague aspirational standards, require independent verification at the design, commissioning, and operational stages, and include meaningful enforcement mechanisms including the ability to revoke or modify consent conditions where commitments are not met.

> **Recommendation 5.** The NSW Government should introduce mandatory cumulative impact assessment and precinct-level planning for data centre clusters. Regional flexibility should be conditional on demonstrated infrastructure readiness across energy,

[10] NZI–CAITG 2026, Key Areas of Focus: Cumulative and systems-level impacts.

water, workforce, connectivity, and emergency services. Community benefit obligations should be explicit conditions of development consent.

Overarching Recommendation

Across all five principles, a consistent theme emerges. The NSW Government needs a reliable, independent evidence base to underpin the Data Centre Guidelines, monitor compliance, and adapt policy as technology and market conditions evolve. AI-driven compute growth is likely to alter infrastructure architectures, workload characteristics, and energy requirements rapidly. Regulatory systems that are overly static will struggle to adapt. An ongoing government–university–industry research collaboration is essential.

NZI recommends that the NSW Government establish a formal **Government–University–Industry Data Centre Research Collaboration**, with the following functions:

- **Standards development:** Independent development and periodic review of PUE, WUE, CUE, embodied carbon, and e-waste benchmarks, drawing on international best practice adapted to NSW conditions.
- **Demand forecasting:** Agreed methodologies for energy and water demand forecasting, with independent validation and mandatory forecast-versus-actual reporting.
- **Performance monitoring:** Ongoing monitoring of actual operational performance against consented benchmarks, with public reporting through a NSW data centre performance dashboard.
- **Policy research:** Continuous evidence generation to support policy refinement, including on cost allocation, cumulative impacts, technology pathways, climate resilience, and AI-driven demand growth.
- **Workforce and capability development:** Research on skills needs and local content opportunities to maximise the economic benefit of data centre investment for NSW.

The University of Sydney, through NZI, stands ready to contribute to this collaboration. We have the interdisciplinary research capability, the existing government and industry relationships, and the institutional independence necessary to serve as a trusted research partner. The University of Sydney is ranked second in Australia for sustainability in the QS Sustainability Rankings 2026, reflecting a sustained commitment to research that supports practical decarbonisation and resource stewardship.

Overarching Recommendation. The NSW Government should establish a formal Government–University–Industry Data Centre Research Collaboration, with NZI and other relevant university research groups engaged to provide independent standards development, demand forecast validation, performance monitoring, and ongoing policy research to underpin the NSW Data Centre Guidelines.